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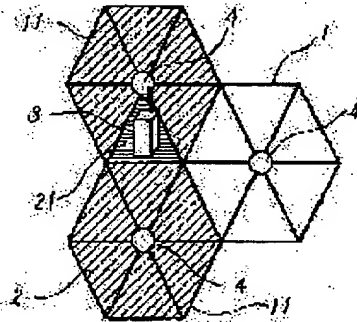
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AIKAWA SATOSHI**(54) RESOURCE RESERVATION METHOD EMPLOYING SECTOR ANTENNA****(57)Abstract**

**PROBLEM TO BE SOLVED:** To effectively reserve resources and to reduce the time from start to end of hand-over in a resource reservation method for hand-over in a mobile communication system.

**SOLUTION:** In the case of a hand-over conducted when a terminal station moves to another cell covered by some other base station different from a cell 1 covered by a base station 4 to which the terminal station 3 has registered its position in a system where a sector antenna is employed for signal transmission through a radio channel between the base station 4 and the terminal station 3, the hand-over, the base station 4 that covers a cell adjacent to a sector 2 in which the terminal station 3 is contained allows only the terminal station 3 to exclusively use before the start of a hand-over a logical channel in a stationary network connecting to the base station so that a destination cell of the hand-over can reserve a radio channel after the start of the hand-over.

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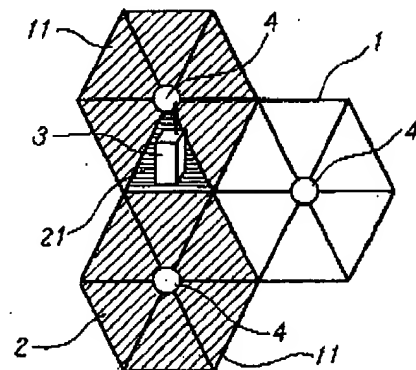
(54) 【発明の名称】 セクタアンテナの使用による資源予約方法

(57) 【要約】

【課題】 移動通信方式におけるハンドオーバーに際する資源予約方法に関し、効果的な資源の確保と、ハンドオーバーに際する起動から終了までの時間の短縮を図ることを目的とする。

【解決手段】 基地局と端末局間の無線回線による信号伝送でアンテナにセクタアンテナを用いる方式での端末局が、現在位置登録されている基地局がカバーするセルとは異なる基地局がカバーするセルに移行する際に行われるハンドオーバーにおいて、ハンドオーバー起動前に、当該端末局が収容されているセクタに接する隣接セルをカバーする基地局が、該基地局が接続されている固定網における論理的な回線を、当該端末局のみが排他的に使用できるようにし、ハンドオーバー起動後に、ハンドオーバー先のセルにおいて無線回線のチャネルを確保するように構成する。

本発明の実施の形態の第1の例を説明する図(その1)



## 【特許請求の範囲】

【請求項1】 基地局と端末局間の無線回線による信号伝送でアンテナにセクタアンテナを用いる方式での端末局が、現在位置登録されている基地局がカバーするセルとは異なる基地局がカバーするセルに移行する際に行われるハンドオーバーにおいて、

ハンドオーバー起動前に、当該端末局が収容されているセクタに接する隣接セルをカバーする基地局が、該基地局が接続されている固定網における論理的な回線（以下有線資源という）を当該端末局が排他的に使用できるようにし（以下確保という）、ハンドオーバー起動後にハンドオーバー先のセルにおいて無線回線のチャネル（以下無線資源という）を確保することを特徴とするセクタアンテナの使用による資源予約方法。

【請求項2】 単位時間当たりのハンドオーバー起動回数に応じて、有線資源を確保するセルの数を変化させる請求項1記載のセクタアンテナの使用による資源予約方法。

【請求項3】 基地局と端末局間の無線回線による信号伝送でアンテナにセクタアンテナを用いる方式での端末局が、現在位置登録されている基地局に加えて他の基地局とも同時に通信回線を持ち、いずれか通信品質のよい回線を用いて通信を行うサイトダイバーシティにおいて、現在位置登録されている基地局とは異なる基地局を選ぶ際に、端末局が現在収容されているセクタに隣接するセルをカバーする基地局を選んで、複数の回線を構築することを特徴とするセクタアンテナの使用による資源予約方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、移動通信方式におけるハンドオーバーに際しての通信用資源を確保する技術に関し、特に、通信用資源の効果的な利用と、ハンドオーバーの起動から終了までの時間の短縮を図ることが可能で、また、サイトダイバーシティにおいて、端末局が現在収容されている基地局とは異なる基地局を選択することを明確に決定することができる資源予約方法に係る。

## 【0002】

【従来の技術】 図7は従来の資源予約について説明する図であって、数字符号1はセル、3は端末局、4は基地局、11は有線資源の確保されているセルを表わしている。このように従来は、通信を行う端末局が現在収容されている（すなわち位置登録されている）基地局がカバーするセルにおいてのみ有線および無線資源を確保し、端末局と通信の相手局との間の通信用回線（以下通信チャネルという）として使用していた。

【0003】 そして、ハンドオーバーが起動した後に、ハンドオーバー先のセルをカバーする基地局において有線資源および無線資源を確保し、ハンドオーバー前のセルにおける通信チャネルからハンドオーバー先のセルで確保した

通信チャネルへ切り替えて通信を継続していた。なお、上記通信チャネルは有線区間のチャネル（以下有線チャネルという）と無線区間のチャネル（以下無線チャネルという）とからなる。

【0004】 例えば、ディジタル自動車電話の場合、端末局がTDMAの空き区間を利用して周辺基地局の電波の状況（無線チャネルの通信品質）を観測し、その電波の状況を自身が収容されている基地局に報告する。当該端末局が収容されている基地局は、端末局からの報告を基に、現在の通信チャネルを構成する無線チャネルよりも、他の基地局に通信品質のよい無線チャネルが存在する場合、通信品質のよい無線チャネルを保有する基地局に無線資源が空いているか否かを確認し、空いている場合には、通信品質の良い無線チャネルを保有する基地局がカバーするセルへのハンドオーバーを起動する。

【0005】 ハンドオーバーが起動されたら、端末局が収容している基地局は、交換機に対しハンドオーバー先のセルをカバーする基地局への通信チャネルを確保するように要求すると同時に、端末局へも無線チャネルの新しい基地局への切替を指示する。新しい通信チャネルが確立された後、交換機は、旧基地局への通信チャネルを解放する。

【0006】 PHSの場合には、端末局が現在の電波の状況を観測する。そして、回線品質がある閾値を超えて悪化したときハンドオーバーが起動される。ハンドオーバーが起動されるといったん無線チャネルは切断され、端末局は次に収容されるべき基地局を探す。基地局が見つかった場合、初めて発呼を行う場合と同様に認証を行ってチャネルを取得し、ハンドオーバー起動前の通信チャネルを回復する。

【0007】 参考文献（Lee, Cho, 'Virtual Mobile Zone Architecture for Mobility Support in Wireless ATM Network', GLOBECOM' 97, pp1279-1283, 1997）に記載されているVirtual Mobile Zoneの場合、図8に示すように、（図8における数字符号は図7の場合と同様である。）端末局が収容されている基地局に隣接する全てのセルをカバーするそれぞれの基地局において、有線資源を確保する。

【0008】 また、複数の基地局が或る一つの端末局に通信チャネルを割り当てる方式にサイトダイバーシティがあるが、サイトダイバーシティでは有線資源及び無線資源ともに端末局が受信する複数の基地局の受信電力や回線品質を元に通信チャネルを確保する基地局を選択して、通信チャネルを確保し、複数の通信チャネルの中で最も通信品質のよいチャネルを選択して通信する。

## 【0009】

【発明が解決しようとする課題】 上述したような従来の方法では、ハンドオーバー起動後に、ハンドオーバー先のセルでの有線資源および無線資源の確保を行うため、実際に通信チャネルが確立され通信に使用できるようになる

までには、かなりの時間がかかるという課題があった。また、従来の方法では頻繁にハンドオーバーが発生した場合、前述のように、通信チャネル確立まで時間がかかることから、通信チャネル切替が端末局の移動に対して遅れ、通信チャネルが切断されることがあるという課題があった。

【0010】一方、前記参考文献によるVirtual Mobile Zoneの方法では、多くの基地局で有線資源を確保しなければならぬため、有線資源の消費が大きい。また、サイトダイバーシチでは、回線品質や電力を元に通信チャネルを確保する基地局の選択を判断するために、通信チャネルを確保する基地局を決定するまでに相当の時間を必要とするという課題があった。

【0011】本発明は、このような従来の課題を解決するために成されたもので、ハンドオーバーに際する通信チャネル確立に要する時間の短縮が可能で、有線資源の消費が少なく、また、サイトダイバーシチにおいて、通信チャネルを確保する基地局を迅速に決定することのできる資源予約方法を提供することを目的としている。

【0012】

【課題を解決するための手段】本発明によれば、上述の課題は、前記特許請求の範囲に記載した手段によって解決される。すなわち、請求項1の発明は、基地局と端末局間の無線回線による信号伝送でアンテナにセクタアンテナを用いる方式での端末局が、現在位置登録されている基地局がカバーするセルとは異なる基地局がカバーするセルに移動する際に行われるハンドオーバーにおいて、

【0013】ハンドオーバー起動前に、当該端末局が収容されているセクタに接する隣接セルをカバーする基地局が、該基地局が接続されている固定網における論理的な回線（有線資源）を当該端末局が排他的に使用（確保）できるようにし、ハンドオーバー起動後に、ハンドオーバー先のセルにおいて無線回線のチャネル（無線資源）を確保するセクタアンテナの使用による資源予約方法である。

【0014】請求項2の発明は、前記請求項1記載のセクタアンテナの使用による資源予約方法において、単位時間当たりのハンドオーバー起動回数に応じて、有線資源が確保されるセルの数を変化させるように構成したものである。

【0015】請求項3の発明は、基地局と端末局間の無線回線による信号伝送でアンテナにセクタアンテナを用いる方式での端末局が、現在位置登録されている基地局に加えて他の基地局とも同時に通信回線を持ち、いずれか通信品質のよい回線を用いて通信を行うサイトダイバーシチにおいて、現在位置登録されている基地局とは異なる基地局を選ぶ際に、端末局が現在収容されているセクタに隣接するセルをカバーする基地局を選んで、複数の回線を構築するセクタアンテナの使用による資源予約方法である。

【0016】本発明においては、ある基地局に位置登録されている端末局が、当該基地局との通信用のチャネルを確保する際に、現在収容されているセルの隣接セルをカバーする基地局での有線資源を同時に確保しておく。ただし、基地局のアンテナとしてセクタアンテナを用いることにより、端末局が収容されている基地局に対するすべての隣接基地局ではなく、端末局が存在するセクタに接する隣接セルをカバーする基地局でのみ有線資源を確保しておく。

10. 【0017】また、端末局のセクタ間の移動が頻繁に発生する場合、もしくはセル間の移動が頻繁に発生する場合は、隣接基地局のほか、端末局が収容されている基地局と上記の方法で有線資源が確保されている隣接基地局の周辺において、更に、有線資源を確保する基地局を増やす。このようにすることにより、端末局が複数のセルを短時間に横断する場合でも、事前に移動先のセルにおいて有線資源が確保されていることから、通信チャネル確立までの時間を短縮できる。

20. 【0018】さらに一つのセルをセクタに分割することで、端末局が移動すると考えられる隣接セルを絞り、有線資源の消費を低減する。サイトダイバーシチを行う場合は、上記の方法によって選択された隣接基地局と通信チャネルを確保することにより、通信チャネルを確保する基地局の選択を端末局の移動や通信開始と同時に決定できる。

【0019】

【発明の実施の形態】図1～図3は本発明の実施の形態の第1の例について説明する図であって、請求項1の発明に対応しており、6セクタのセクタアンテナを用いた場合について示している。同図において、数字符号1はセル、2はセクタ、3は端末局、4は基地局、11は有線資源の確保されているセル、21は端末局が存在するセクタを表わしている。

30. 【0020】位置登録により端末局を収容した基地局は、収容され新規に発呼要求を行う端末局、もしくは既に通信を行い、ハンドオーバーを要求してきた端末局に対し、無線資源および有線資源を通信チャネルとして割り当てる。その際に、図1に示すように、端末局が収容されるセクタの隣接セルをカバーする基地局に限り、当該端末局向けの有線資源を同時に確保しておく。

40. 【0021】端末局が移動し、図2に示すように、有線資源を確保している隣接基地局がカバーするセルに移動しようとする場合、ハンドオーバーが起動され、隣接基地局は、当該端末局向けの無線資源を確保し、既に確保済みの有線資源と共に当該端末局に割り当てる。

【0022】ハンドオーバー起動前に、端末局が収容されていた基地局がカバーするセルでは無線資源は解放されるが、端末局が移動したセクタに対して隣接セルとなるため、有線資源は解放されない。

50. 【0023】一方端末局が、端末局自身が収容されてい

るセクタの隣接セルの方向ではなく、他の方向に移動した場合（図1の状態から図3の状態へ遷移する場合）、図3に示すように端末局は、同一基地局の隣接セクタに移動することになる。従ってこの場合は、端末局が隣接セクタに移動すると同時に、有線資源を確保する基地局も移動する。

【0024】図4は本発明の実施の形態の第2の例について説明する図であって、請求項2の発明に対応しており、6セクタのセクタアンテナを用いた場合について示している。同図において、数字符号12は、この例において新たに確保されたセルを示しており、その他は、先

に説明した図1～図3の場合と同様である。  
【0025】この例は、端末局のセクタ間の移動が頻繁に発生する場合、もしくは、セル間の移動が頻繁に発生する場合に大きな効果がある。この例では、単位時間当たりのハンドオーバー起動回数をパラメータとして、図4に示すように端末局が収容されている基地局に対する隣接基地局のほか、端末局が収容されている基地局と隣接基地局の周辺のいくつかの基地局において有線資源を確保する。

【0026】図5は本発明の実施の形態の第3の例について説明する図であって、請求項3の発明に対応しており、6セクタのセクタアンテナを用いた場合について示している。同図において、数字符号13は、この例において通信チャネルを確保されたセルを示しており、その他は、先に説明した図1～図3の場合と同様である。

【0027】この例は、サイトダイバーシチに関する例である。サイトダイバーシチを行う際には、現在端末局が収容されている基地局とは異なる他の基地局を選択する場合、同図に示すように、端末局が収容されているセクタの隣接セルをカバーする基地局を選択し、当該端末局向けの通信チャネルを確保する。

【0028】

【発明の効果】図6は本発明のように、有線資源を事前に確保する方法（請求項1の発明に対応する）と、従来の方法との手順を比較して示す図であって、それぞれの手順を流れ図として示している。同図に示すように、従来の方法では、ハンドオーバーを起動してから、交換機へハンドオーバー先基地局の有線チャネルの確保を要求していたが、本発明ではその必要がないので、ハンドオーバーを起動してからハンドオーバーが完了するまでの時間を大

幅に短縮することができることが分かる。

【0029】さらに、本発明では、基地局アンテナとして、セクタアンテナを用いることにより、全ての隣接セルで有線資源を確保するという必要がないから、必要以上の有線資源を確保することによる資源の浪費を押さえることができる。

【0030】また請求項2の発明によれば、頻繁に、セクタ間、もしくは、セル間で移動を行う端末局に対して、通信チャネル確立までの時間を短縮できる。また、請求項3の発明によれば、サイトダイバーシチを行う際に、通信チャネルを確保すべき基地局を明確に決定できるから、基地局を選択するのに要する時間を短縮できる利点がある。

【図面の簡単な説明】

【図1】本発明の実施の形態の第1の例を説明する図（その1）である。

【図2】本発明の実施の形態の第1の例を説明する図（その2）である。

【図3】本発明の実施の形態の第1の例を説明する図（その3）である。

【図4】本発明の実施の形態の第2の例を説明する図である。

【図5】本発明の実施の形態の第3の例を説明する図である。

【図6】有線資源を事前に確保する方法と従来の方法との手順を比較する図である。

【図7】従来の資源予約の第1の例について説明する図である。

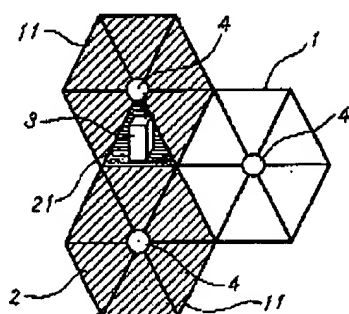
【図8】従来の資源予約の第2の例について説明する図である。

【符号の説明】

- |    |                        |
|----|------------------------|
| 1  | セル                     |
| 2  | セクタ                    |
| 3  | 端末局                    |
| 4  | 基地局                    |
| 11 | 有線資源の確保されているセル         |
| 12 | 請求項2によって新たに確保されるセル     |
| 13 | 請求項3によって通信チャネルを確保されるセル |
| 21 | 端末局が存在するセクタ            |

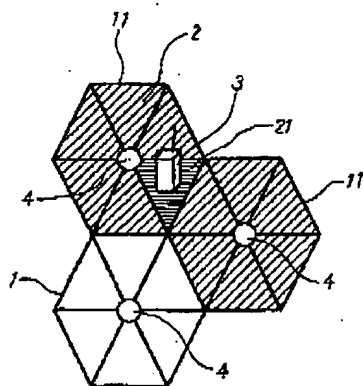
【図1】

本発明の実施の形態の第1の例を説明する図(その1)



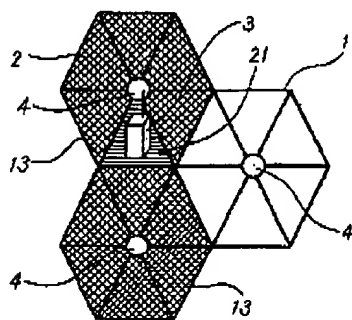
【図3】

本発明の実施の形態の第1の例を説明する図(その3)



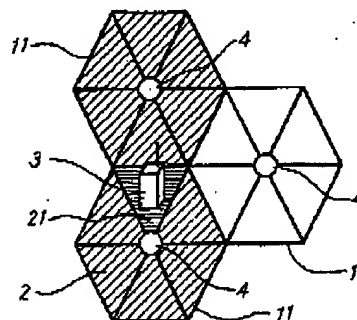
【図5】

本発明の実施の形態の第3の例を説明する図



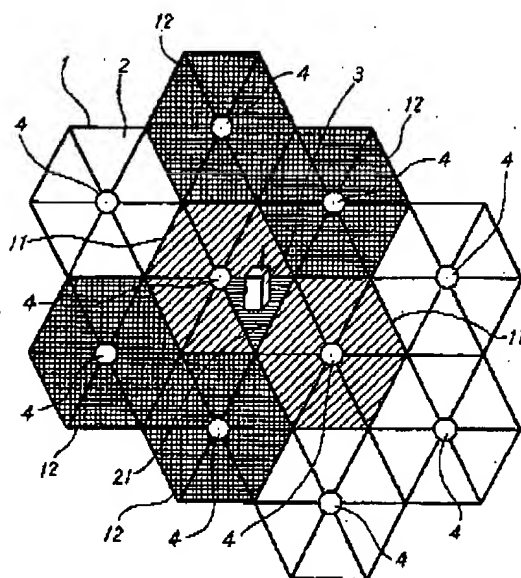
【図2】

本発明の実施の形態の第1の例を説明する図(その2)



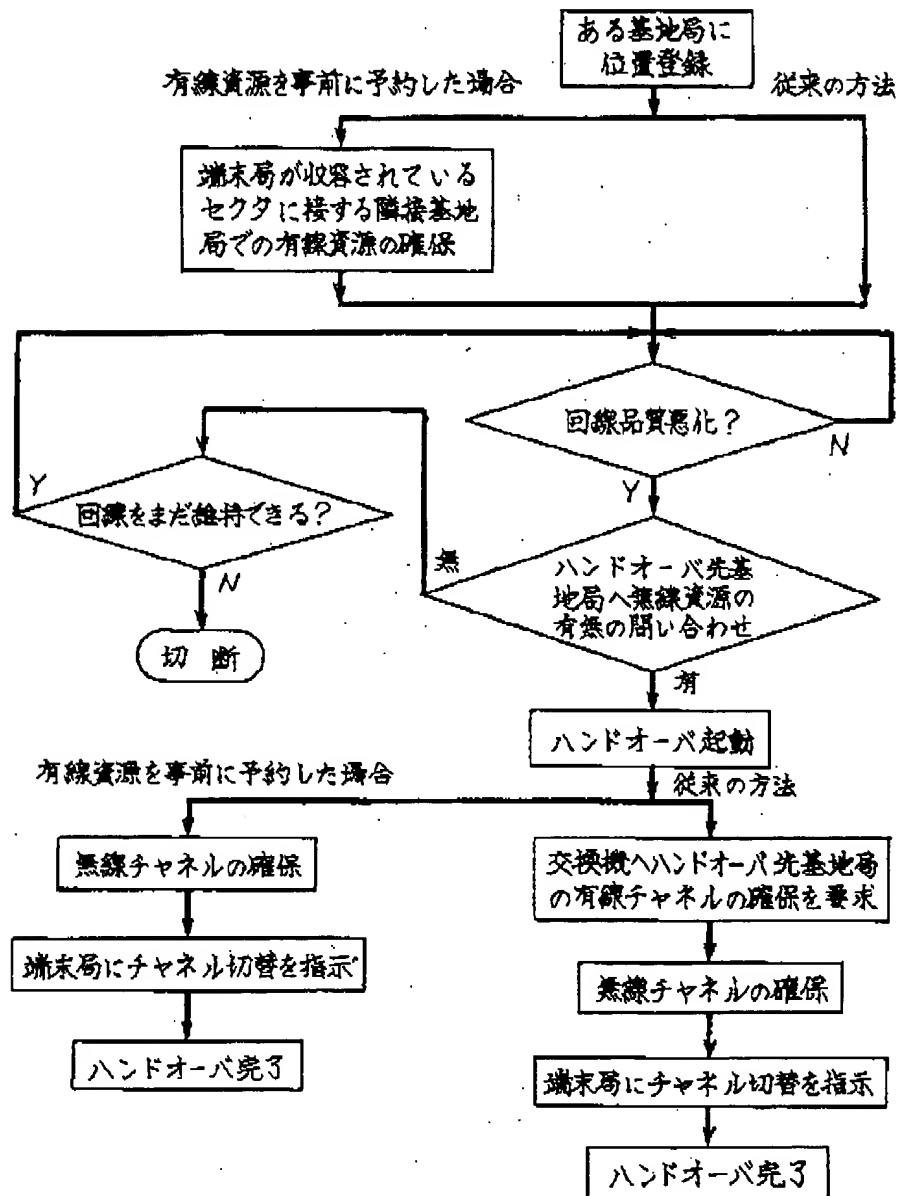
【図4】

本発明の実施の形態の第2の例を説明する図



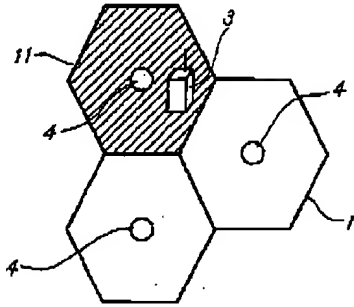
【図6】

有線資源を事前に確保する方法と従来の方法との  
手順を比較する図



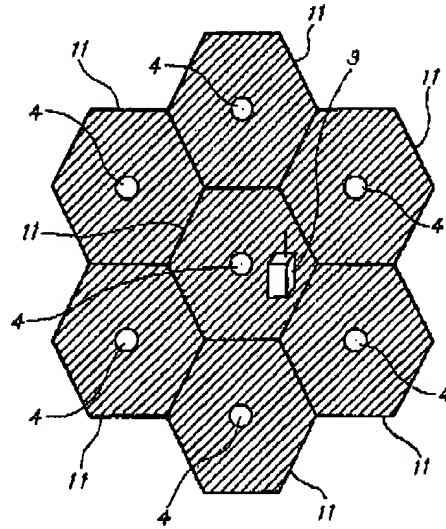
【図7】

従来の資源予約の第1の例について説明する図



【図8】

従来の資源予約の第2の例について説明する図





\* NOTICES \*

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1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

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CLAIMS

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[Claim(s)]

[Claim 1] The terminal station in the method which uses a sector antenna for an antenna by the signal transmission by the wireless circuit between a base station and a terminal station In the handover performed in case it shifts to the cel which a different base station from the cel which the base station by which current position registration is carried out covers covers The base station which covers the contiguity cel which touches the sector in which the terminal station concerned is held before handover starting The terminal station concerned enables it to use exclusively the logical circuit (henceforth a cable resource) in the fixed network to which this base station is connected (henceforth reservation). The resource reservation approach by use of the sector antenna characterized by securing the channel (henceforth a wireless resource) of a wireless circuit in the cel of the handover point after handover starting.

[Claim 2] The resource reservation approach by use of the sector antenna according to claim 1 to which the number of the cels which secure a cable resource is changed according to the handover number of starts per unit time amount.

[Claim 3] The terminal station in the method which uses a sector antenna for an antenna by the signal transmission by the wireless circuit between a base station and a terminal station In the site diversity which other base stations have a communication line in coincidence in addition to the base station by which current position registration is carried out, and communicates using a circuit with sufficient any or

communication link quality The resource reservation approach by use of the sector antenna characterized by for a terminal station choosing the base station which covers the cel which adjoins the sector by which current hold is carried out, and building two or more circuits in case a different base station from the base station by which current position registration is carried out is chosen.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] About the technique of securing the resource for a communication link for the handover in a migration communication mode, especially, this invention can aim at [ effective use of the resource for a communication link, and ] compaction of the time amount from starting of a handover to termination, and a terminal office starts [ choosing a different base station from the base station held now, and ] the resource reservation approach which can be determined clearly in site diversity.

[0002]

[Description of the Prior Art] Drawing 7 is drawing explaining the conventional resource reservation, and, in the figure sign 1, a cel and 3 express the cel from which, as for a terminal office and 4, a base station is secured, and, as for 11, the cable resource is secured. Thus, conventionally, the cable and the wireless resource were secured only in the cel which the base station where current hold of the terminal station which communicates is carried out (that is, location registration is carried out) covers, and it was used as a circuit for a communication link between a terminal station and a communicative distant office (henceforth a communication channel).

[0003] And after the handover started, communication link tea NERUHE change \*\*\*\*\* which secured the cable resource and the wireless resource in the base station which covers the cel of the handover point, and was secured from the communication channel in the cel in front of a handover in the cel of the handover point was continued. In addition, the above-mentioned communication channel consists of a channel (henceforth a cable channel) of a section of wire

line, and a channel (henceforth a radio channel) of the wireless section.

[0004] For example, in the case of a digital land mobile radiotelephone, a terminal station observes the situation (communication link quality of a radio channel) of the electric wave of a circumference base station using the empty section of TDMA, and the situation of the electric wave is reported to the base station in which self is held. The base station in which the terminal station concerned is held starts the handover to the cel which the base station which holds a radio channel with communication link quality more sufficient when checking whether the wireless resource is vacant to the base station which holds a radio channel with sufficient communication link quality when a radio channel with sufficient communication link quality exists in other base stations and it is vacant in it than the radio channel which constitutes a current communication channel based on the report from a terminal station covers.

[0005] If a handover is started, the base station in which the terminal station is held directs the change to the base station where a radio channel is new also to a terminal station at the same time it requires that the communication channel to the base station which covers the cel of the handover point to the exchange should be secured. After a new communication channel is established, the exchange releases the communication channel to the old base station.

[0006] In the case of PHS, a terminal station observes the situation of a current electric wave. And a handover is started when it gets worse exceeding a threshold with circuit quality. If a handover is started, a radio channel will once be cut, and a terminal station looks for the base station which should be held in a degree. When a base station is found, it attests like the case where call origination is performed for the first time, a channel is acquired, and the communication channel before handover starting is recovered.

[0007] In Virtual Mobile Zone indicated by bibliography (1283 Lee, Cho, "Virtual Mobile Zone Architecture for MobilitySupport in Wireless ATM Network", GLOBECOM' 97, pp1279- 1997), as shown in drawing 8, a cable resource is secured in each base station which covers all the cels that

adjoin the base station in which the terminal (figure sign in drawing 8 is the same as that of case of drawing 7 .) office is held.

[0008] Moreover, although site diversity is in the method with which two or more base stations assign a communication channel to one certain terminal station, in site diversity, the base station which secures a communication channel based on two or more received power and circuit quality of a base station which a terminal station receives is chosen, a communication channel is secured, and in two or more communication channels, a cable resource \*\*\*\* wireless resource chooses a channel with the most sufficient communication link quality, and communicates.

[0009]

[Problem(s) to be Solved by the Invention] By the conventional approach which was mentioned above, since reservation of the cable resource in the cel of the handover point and a wireless resource was performed after handover starting, by the time a communication channel is actually established and it could use it for the communication link, the technical problem that it took most time amount occurred. Moreover, by the conventional approach, when a handover occurred frequently, since time amount was taken to communication channel establishment, the technical problem that delay and a communication channel might be cut for a communication channel change to migration of a terminal station occurred as mentioned above.

[0010] On the other hand, in order to have to secure a cable resource by the approach of Virtual Mobile Zone by said bibliography in many base stations, consumption of a cable resource is large. Moreover, in site diversity, in order to judge selection of the base station which secures a communication channel based on circuit quality or power, the technical problem that considerable time amount would be needed by the time it determines the base station which secures a communication channel occurred.

[0011] Compaction of the time amount which the communication channel establishment which accomplished in order to solve such a conventional technical problem, and faces hand-over takes is possible, and there is little consumption of a cable resource, and this invention aims at offering the resource

reservation approach that the base station which secures a communication channel can be quickly determined in site diversity.

[0012]

[Means for Solving the Problem] According to this invention, an above-mentioned technical problem is solved by the means indicated to said claim. That is, for invention of claim 1, it sets to the handover performed in case it moves to the cel which a different base station covers, and the cel which the base station where current position registration of the terminal station in the method which uses a sector antenna for an antenna by the signal transmission by the wireless circuit between a base station and a terminal station is carried out covers is [0013]. The base station which covers the contiguity cel which touches the sector in which the terminal station concerned is held before handover starting is the resource reservation approach by use of the sector antenna which the terminal station concerned enables it to use exclusively the logical circuit ( cable resource ) in the fixed network to which this base station is connected ( reservation ) , and secures the channel ( wireless resource ) of a wireless circuit in the cel of the handover point after handover starting .

[0014] In the resource reservation approach by use of said sector antenna according to claim 1, invention of claim 2 is constituted so that the number of cels with which a cable resource is secured may be changed according to the handover number of starts per unit time amount.

[0015] The terminal station in the method which uses a sector antenna for an antenna by the signal transmission by the wireless circuit between a base station and a terminal station invention of claim 3 In the site diversity which other base stations have a communication line in coincidence in addition to the base station by which current position registration is carried out, and communicates using a circuit with sufficient any or communication link quality In case the base station by which current position registration is carried out chooses a different base station, it is the resource reservation approach by use of the sector antenna with which a terminal station chooses the base station which covers the cel which adjoins the sector by which current hold is carried out, and builds two or more circuits.

[0016] In this invention, in case the terminal station by which location registration is carried out to a certain base station secures the channel for the communication link with the base station concerned, the cable resource in the base station which covers the contiguity cel of the cel by which current hold is carried out is secured to coincidence. However, the cable resource is secured by using a sector antenna as an antenna of a base station only in the base station which covers the contiguity cel which touches the sector in which a terminal station exists instead of all the adjoining base stations to the base station in which the terminal station is held.

[0017] Moreover, when migration between the sectors of a terminal station occurs frequently, or when migration between cels occurs frequently, the base station which secures a cable resource further in the circumference of the base station in which the terminal station besides an adjoining base station is held, and the adjoining base station where the cable resource is secured by the above-mentioned approach is increased. Even when a terminal station crosses two or more cels by doing in this way for a short time, since the cable resource is secured in the cel of a migration place in advance, the time amount to communication channel establishment can be shortened.

[0018] Furthermore, by dividing the cel of \*\* into a sector, the contiguity cel considered that a terminal station moves is extracted, and consumption of a cable resource is reduced. When performing site diversity, selection of the base station which secures a communication channel can be determined as migration, communication link initiation, and coincidence of a terminal station by securing the adjoining base station and communication channel which were chosen by the above-mentioned approach.

[0019]

[Embodiment of the Invention] Drawing 1 - drawing 3 are drawings explaining the 1st example of the gestalt of operation of this invention, support invention of claim 1 and show the case where the sector antenna of 6 sector is used. In this drawing, as for the figure sign 1, the terminal station expresses the existing sector, as for a cel, the cel from which, as for a terminal station and 4, a base station is secured, and, as

for a sector and 3, the cable resource is secured for 2, as for 11, and 21.

[0020] The base station in which the terminal station was held by location registration assigns a wireless resource and a cable resource as a communication channel to the terminal station which is held and performs a call request newly, or the terminal station which already communicated and has required the handover. As shown in drawing 1 in that case, it restricts to the base station which covers the contiguity cel which is the sector in which a terminal office is held, and the cable resource for the terminal offices concerned is secured to coincidence.

[0021] As shown in drawing 2, when a terminal office tends to move and it is going to move to the cel which the adjoining base station which has secured the cable resource covers, a handover is started, and an adjoining base station secures the wireless resource for the terminal offices concerned, and assigns it to the terminal office concerned with a cable resource [ finishing / reservation / already ].

[0022] In the cel which the base station in which the terminal station was held before handover starting covers, although a wireless resource is released, since it serves as a contiguity cel to the sector which the terminal station moved, a cable resource is not released.

[0023] On the other hand, when a terminal office moves in the other directions instead of a direction of the contiguity cel which is the sector in which the terminal office itself is held, as shown in drawing 3, a terminal office will be moved to the contiguity sector of the same base station (when drawing 3 carries out condition HE transition from the condition of drawing 1). Therefore, in this case, it moves also in the base station which secures a cable resource at the same time a terminal station moves to a contiguity sector.

[0024] Drawing 4 is drawing explaining the 2nd example of the gestalt of operation of this invention, supports invention of claim 2 and shows the case where the sector antenna of 6 sector is used. In this drawing, the figure sign 12 shows the cel newly secured in this example, and others of it are the same as that of the case of drawing 1 - drawing 3 which were explained previously.

[0025] This example has big effectiveness, when migration between the sectors of a terminal station occurs frequently, or when migration between cels occurs frequently. In this example, a cable resource is secured in some surrounding base stations of the base station in which the terminal office besides to the base station in which the terminal office is held as shown in drawing 4 an adjoining base station is held, and an adjoining base station by making the handover number of starts per unit time amount into a parameter.

[0026] Drawing 5 is drawing explaining the 3rd example of the gestalt of operation of this invention, supports invention of claim 3 and shows the case where the sector antenna of 6 sector is used. In this drawing, the figure sign 13 shows the cel which had the communication channel secured in this example, and others of it are the same as that of the case of drawing 1 - drawing 3 which were explained previously.

[0027] This example is an example about site diversity. In case site diversity is performed, when choosing other different base stations from the base station in which the present terminal office is held, as shown in this drawing, the base station which covers the contiguity cel which is the sector in which the terminal office is held is chosen, and the communication channel for the terminal offices concerned is secured.

[0028]

[Effect of the Invention] Drawing 6 is drawing comparing and showing the procedure of the approach (it corresponds to invention of claim 1) of securing a cable resource in advance, and the conventional approach, like this invention, and shows each procedure as a flow chart. As shown in this drawing, by the conventional approach, after starting the handover, reservation of the cable channel of a handover point base station was demanded of the exchange, but since the need does not exist, by this invention, it turns out that time amount after starting a handover until a handover is completed can be shortened sharply.

[0029] Furthermore, in this invention, since it is necessary to say that no a cable resource is secured in contiguity cels by using a sector antenna as a base station antenna, waste of the resource by securing the cable resource beyond the need can be pressed down.

[0030] Moreover, according to invention of claim 2, the time amount to communication channel establishment can be frequently shortened to the terminal station which moves between sectors or between cels. Moreover, according to invention of claim 3, since the base station which should secure a communication channel can be clearly determined in case site diversity is performed, there is an advantage which can shorten the time amount taken to choose a base station.

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## TECHNICAL FIELD

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[Field of the Invention] About the technique of securing the resource for a communication link for the handover in a migration communication mode, especially, this invention can aim at [ effective use of the resource for a communication link, and ] compaction of the time amount from starting of a handover to termination, and a terminal office starts [ choosing a different base station from the base station held now, and ] the resource reservation approach which can be determined clearly in site diversity.

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## PRIOR ART

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[Description of the Prior Art] Drawing 7 is drawing explaining the conventional resource reservation, and, in the figure sign 1, a cel and 3 express the cel from which, as for a terminal office and 4, a base station is secured, and, as for 11, the cable resource is secured. Thus, conventionally, the cable and the wireless resource were secured only in the cel which the base station where current hold of the terminal station which communicates is carried out (that is, location registration is carried out) covers, and it was used as a circuit for a communication link between a terminal station and a communicative distant office (henceforth a communication channel).

[0003] And after the handover started, communication link tea NERUHE change \*\*\*\*\* which secured the cable resource and the wireless resource in the base station which covers the cel of the handover point, and was secured from the communication channel in the cel in front of a handover in the cel of the handover point was continued. In addition, the above-mentioned communication channel consists of a channel

(henceforth a cable channel) of a section of wire line, and a channel (henceforth a radio channel) of the wireless section.

[0004] For example, in the case of a digital land mobile radiotelephone, a terminal station observes the situation (communication link quality of a radio channel) of the electric wave of a circumference base station using the empty section of TDMA, and the situation of the electric wave is reported to the base station in which self is held. The base station in which the terminal station concerned is held starts the handover to the cel which the base station which holds a radio channel with communication link quality more sufficient when checking whether the wireless resource is vacant to the base station which holds a radio channel with sufficient communication link quality when a radio channel with sufficient communication link quality exists in other base stations and it is vacant in it than the radio channel which constitutes a current communication channel based on the report from a terminal station covers.

[0005] If a handover is started, the base station in which the terminal station is held directs the change to the base station where a radio channel is new also to a terminal station at the same time it requires that the communication channel to the base station which covers the cel of the handover point to the exchange should be secured. After a new communication channel is established, the exchange releases the communication channel to the old base station.

[0006] In the case of PHS, a terminal station observes the situation of a current electric wave. And a handover is started when it gets worse exceeding a threshold with circuit quality. If a handover is started, a radio channel will once be cut, and a terminal station looks for the base station which should be held in a degree. When a base station is found, it attests like the case where call origination is performed for the first time, a channel is acquired, and the communication channel before handover starting is recovered.

[0007] In Virtual Mobile Zone indicated by bibliography (1283 Lee, Cho, "Virtual Mobile Zone Architecture for MobilitySupport in Wireless ATM Network", GLOBECOM' 97, pp1279- 1997), as shown in drawing 8 , a cable resource is secured

in each base station which covers all the cells that adjoin the base station in which the terminal (figure sign in drawing 8 is the same as that of case of drawing 7.) office is held.

[0008] Moreover, although site diversity is in the method with which two or more base stations assign a communication channel to one certain terminal station, in site diversity, the base station which secures a communication channel based on two or more received power and circuit quality of a base station which a terminal station receives is chosen, a communication channel is secured, and in two or more communication channels, a cable resource \*\*\*\* wireless resource chooses a channel with the most sufficient communication link quality, and communicates.

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#### TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] By the conventional approach which was mentioned above, since reservation of the cable resource in the cell of the handover point and a wireless resource was performed after handover starting, by the time a communication channel is actually established and it could use it for the communication link, the technical problem that it took most time amount occurred. Moreover, by the conventional approach, when a handover occurred frequently, since time amount was taken to communication channel establishment, the technical problem that delay and a communication channel might be cut for a communication channel change to migration of a terminal station occurred as mentioned above.

[0010] On the other hand, in order to have to secure a cable resource by the approach of Virtual Mobile Zone by said bibliography in many base stations, consumption of a cable resource is large. Moreover, in site diversity, in order to judge selection of the base station which secures a communication channel based on circuit quality or power, the technical problem that considerable time amount would be needed by the time it determines the base station which secures a communication channel occurred.

[0011] Compaction of the time amount which the communication channel establishment which accomplished in order to solve such a conventional technical problem, and faces

hand-over takes is possible, and there is little consumption of a cable resource, and this invention aims at offering the resource reservation approach that the base station which secures a communication channel can be quickly determined in site diversity.

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#### MEANS

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[Means for Solving the Problem] According to this invention, an above-mentioned technical problem is solved by the means indicated to said claim. That is, for invention of claim 1, it sets to the handover performed in case it moves to the cell which a different base station covers, and the cell which the base station where current position registration of the terminal station in the method which uses a sector antenna for an antenna by the signal transmission by the wireless circuit between a base station and a terminal station is carried out covers is [0013]. The base station which covers the contiguity cell which touches the sector in which the terminal station concerned is held before handover starting is the resource reservation approach by use of the sector antenna which the terminal station concerned enables it to use exclusively the logical circuit ( cable resource ) in the fixed network to which this base station is connected ( reservation ) , and secures the channel ( wireless resource ) of a wireless circuit in the cell of the handover point after handover starting .

[0014] In the resource reservation approach by use of said sector antenna according to claim 1, invention of claim 2 is constituted so that the number of cells with which a cable resource is secured may be changed according to the handover number of starts per unit time amount.

[0015] The terminal station in the method which uses a sector antenna for an antenna by the signal transmission by the wireless circuit between a base station and a terminal station invention of claim 3 In the site diversity which other base stations have a communication line in coincidence in addition to the base station by which current position registration is carried out, and communicates using a circuit with sufficient any or communication link quality In case the base station by which current position registration is carried out chooses a different base

station, it is the resource reservation approach by use of the sector antenna with which a terminal station chooses the base station which covers the cel which adjoins the sector by which current hold is carried out, and builds two or more circuits.

[0016] In this invention, in case the terminal station by which location registration is carried out to a certain base station secures the channel for the communication link with the base station concerned, the cable resource in the base station which covers the contiguity cel of the cel by which current hold is carried out is secured to coincidence. However, the cable resource is secured by using a sector antenna as an antenna of a base station only in the base station which covers the contiguity cel which touches the sector in which a terminal station exists instead of all the adjoining base stations to the base station in which the terminal station is held.

[0017] Moreover, when migration between the sectors of a terminal station occurs frequently, or when migration between cels occurs frequently, the base station which secures a cable resource further in the circumference of the base station in which the terminal station besides an adjoining base station is held, and the adjoining base station where the cable resource is secured by the above-mentioned approach is increased. Even when a terminal station crosses two or more cels by doing in this way for a short time, since the cable resource is secured in the cel of a migration place in advance, the time amount to communication channel establishment can be shortened.

[0018] Furthermore, by dividing the cel of - \*\* into a sector, the contiguity cel considered that a terminal station moves is extracted, and consumption of a cable resource is reduced. When performing site diversity, selection of the base station which secures a communication channel can be determined as migration, communication link initiation, and coincidence of a terminal station by securing the adjoining base station and communication channel which were chosen by the above-mentioned approach.

[0019]

[Embodiment of the Invention] Drawing 1 - drawing 3 are drawings explaining the 1st example of the gestalt of operation of this invention, support invention of claim 1 and show

the case where the sector antenna of 6 sector is used. In this drawing, as for the figure sign 1, the terminal station expresses the existing sector, as for a cel, the cel from which, as for a terminal station and 4, a base station is secured, and, as for a sector and 3, the cable resource is secured for 2, as for 11, and 21.

[0020] The base station in which the terminal station was held by location registration assigns a wireless resource and a cable resource as a communication channel to the terminal station which is held and performs a call request newly, or the terminal station which already communicated and has required the handover. As shown in drawing 1 in that case, it restricts to the base station which covers the contiguity cel which is the sector in which a terminal office is held, and the cable resource for the terminal offices concerned is secured to coincidence.

[0021] As shown in drawing 2, when a terminal office tends to move and it is going to move to the cel which the adjoining base station which has secured the cable resource covers, a handover is started, and an adjoining base station secures the wireless resource for the terminal offices concerned, and assigns it to the terminal office concerned with a cable resource [ finishing / reservation / already ].

[0022] In the cel which the base station in which the terminal station was held before handover starting covers, although a wireless resource is released, since it serves as a contiguity cel to the sector which the terminal station moved, a cable resource is not released.

[0023] On the other hand, when a terminal office moves in the other directions instead of a direction of the contiguity cel which is the sector in which the terminal office itself is held, as shown in drawing 3, a terminal office will be moved to the contiguity sector of the same base station (when drawing 3 carries out condition HE transition from the condition of drawing 1). Therefore, in this case, it moves also in the base station which secures a cable resource at the same time a terminal station moves to a contiguity sector.

[0024] Drawing 4 is drawing explaining the 2nd example of the gestalt of operation of this invention, supports invention of claim 2 and shows the case where the sector antenna of 6



sector is used. In this drawing, the figure sign 12 shows the cel newly secured in this example, and others of it are the same as that of the case of drawing 1 - drawing 3 which were explained previously.

[0025] This example has big effectiveness, when migration between the sectors of a terminal station occurs frequently, or when migration between cels occurs frequently. In this example, a cable resource is secured in some surrounding base stations of the base station in which the terminal office resides to the base station in which the terminal office is held as shown in drawing 4 an adjoining base station is held, and an adjoining base station by making the handover number of starts per unit time amount into a parameter.

[0026] Drawing 5 is drawing explaining the 3rd example of the gestalt of operation of this invention, supports invention of claim 3 and shows the case where the sector antenna of 6 sector is used. In this drawing, the figure sign 13 shows the cel which had the communication channel secured in this example, and others of it are the same as that of the case of drawing 1 - drawing 3 which were explained previously.

[0027] This example is an example about site diversity. In case site diversity is performed, when choosing other different base stations from the base station in which the present terminal office is held, as shown in this drawing, the base station which covers the contiguity cel which is the sector in which the terminal office is held is chosen, and the communication channel for the terminal offices concerned is secured.

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## EFFECT OF THE INVENTION

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[Effect of the Invention] Drawing 6 is drawing comparing and showing the procedure of the approach (it corresponds to invention of claim 1) of securing a cable resource in advance, and the conventional approach, like this invention, and shows each procedure as a flow chart. As shown in this drawing, by the conventional approach, after starting the handover, reservation of the cable channel of a handover point base station was demanded of the exchange, but since the need does not exist, by this invention, it turns out that time amount after starting a handover until a

handover is completed can be shortened sharply.

[0029] Furthermore, in this invention, since it is necessary to say that no a cable resource is secured in contiguity cels by using a sector antenna as a base station antenna, waste of the resource by securing the cable resource beyond the need can be pressed down.

[0030] Moreover, according to invention of claim 2, the time amount to communication channel establishment can be frequently shortened to the terminal station which moves between sectors or between cels. Moreover, according to invention of claim 3, since the base station which should secure a communication channel can be clearly determined in case site diversity is performed, there is an advantage which can shorten the time amount taken to choose a base station.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is drawing (the 1) explaining the 1st example of the gestalt of operation of this invention.

[Drawing 2] It is drawing (the 2) explaining the 1st example of the gestalt of operation of this invention.

[Drawing 3] It is drawing (the 3) explaining the 1st example of the gestalt of operation of this invention.

[Drawing 4] It is drawing explaining the 2nd example of the gestalt of operation of this invention.

[Drawing 5] It is drawing explaining the 3rd example of the gestalt of operation of this invention.

[Drawing 6] It is drawing which compares the procedure of the approach of securing a cable resource in advance, and the conventional approach.

[Drawing 7] It is drawing explaining the 1st example of the conventional resource reservation.

[Drawing 8] It is drawing explaining the 2nd example of the conventional resource reservation.

[Description of Notations]

1 Cel

2 Sector

3 Terminal Station

4 Base Station

11 Cel from which Cable Resource is Secured



12 Cel Newly Secured by Claim 2

13 Cel Which Has Communication Channel  
Secured by Claim 3

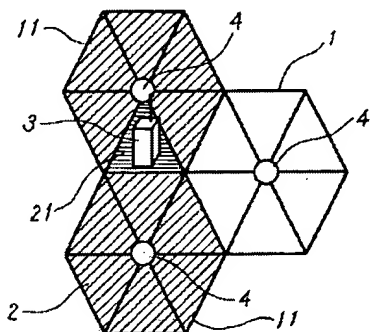
21 Sector in which Terminal Station Exists

\*\*\*\*\*

# DRAWINGS

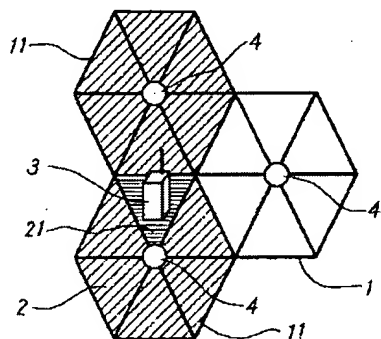
[Drawing 1]

本発明の実施の形態の第1の例を説明する図(その1)



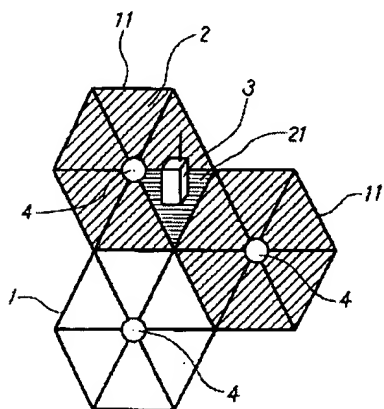
[Drawing 2]

本発明の実施の形態の第1の例を説明する図(その2)



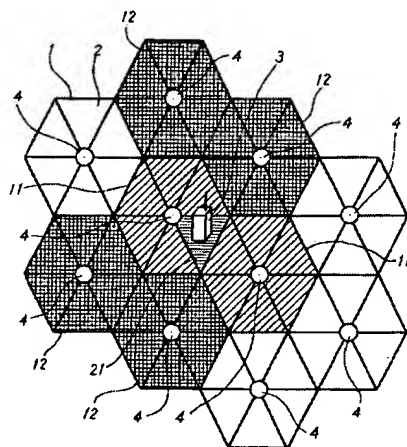
[Drawing 3]

本発明の実施の形態の第1の例を説明する図(その3)



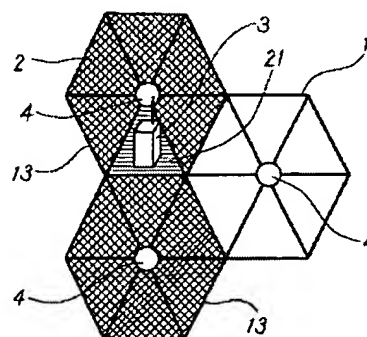
[Drawing 4]

本発明の実施の形態の第2の例を説明する図



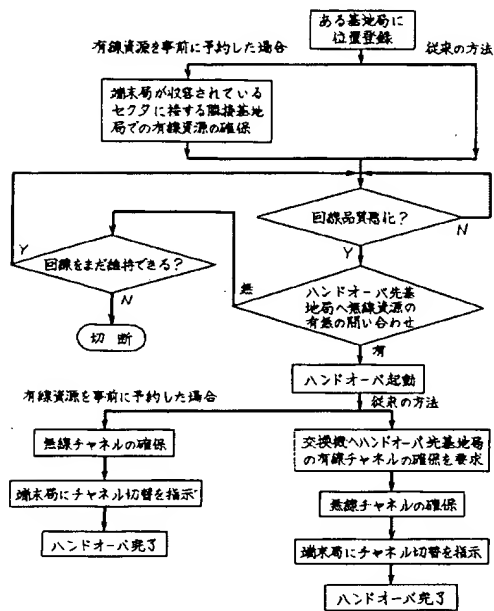
[Drawing 5]

本発明の実施の形態の第3の例を説明する図



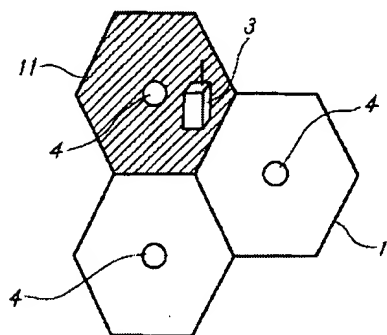
[Drawing 6]

有線資源を事前に確保する方法と従来の方法との  
手順を比較する図



[Drawing 7]

従来の資源予約の第1の例について説明する図



[Drawing 8]

従来の資源予約の第2の例について説明する図

